NLP Project : SENTIMENT ANALYSIS

Twitter validation

1)Import required libraries

In [ ]:
```
import numpy as np
import pandas as pd
import nltk
import seaborn as sns
import matplotlib.pyplot as plt
import re   #regularexpression(remove specialcharacters)
```

In [ ]:
```
df=pd.read_csv('/content/twitter_validation.csv',encoding='ISO-8859-1',header=None)
df.columns=['Id','Media','Target','Text']
df
```

Out[ ]:

	Id	Media	Target	Text
0	3364	Facebook	Irrelevant	I mentioned on Facebook that I was struggling ...
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...
...	...	...	...	...
995	4891	GrandTheftAuto(GTA)	Irrelevant	âï¸ Toronto is the arts and culture capital...
996	4359	CS-GO	Irrelevant	tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...
997	2652	Borderlands	Positive	Today sucked so itâs time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

1000 rows × 4 columns

In [ ]:
```
df.head()
```

Out[ ]:

	Id	Media	Target	Text
0	3364	Facebook	Irrelevant	I mentioned on Facebook that I was struggling ...
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...

In [ ]:
```
df.tail()
```

Out[ ]:

	Id	Media	Target	Text
995	4891	GrandTheftAuto(GTA)	Irrelevant	âï¸ Toronto is the arts and culture capital...
996	4359	CS-GO	Irrelevant	tHIS IS ACTUALLY A GOOD MOVE TOT BRING MORE VI...
997	2652	Borderlands	Positive	Today sucked so itâs time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

In [ ]:
```
df.isna().sum()
```

Out[ ]:
```
Id        0
Media     0
Target    0
Text      0
dtype: int64
```

In [ ]:
```
df.dtypes
```

Out[ ]:
```
Id         int64
Media     object
Target    object
Text      object
dtype: object
```

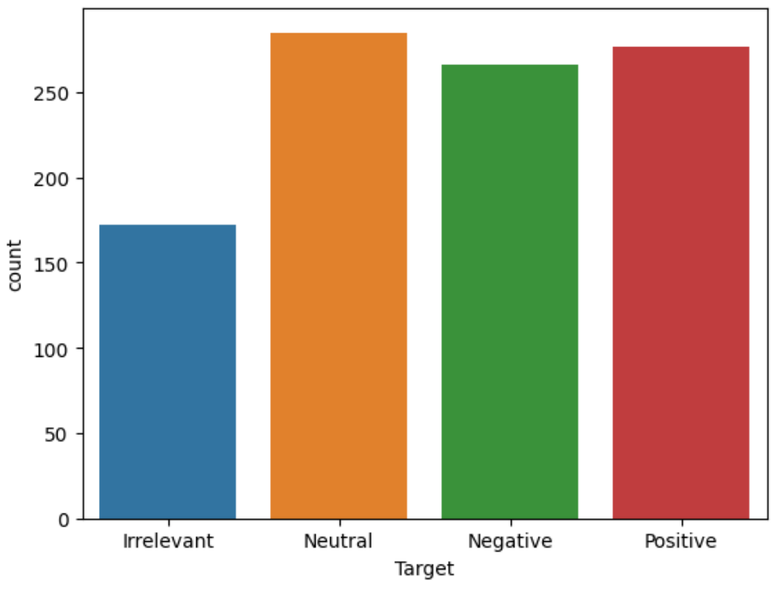
2)Find Value count and Data Visualization

In [ ]:
```
df['Target'].value_counts()
```

Out[ ]:
```
Neutral       285
Positive      277
Negative      266
Irrelevant    172
Name: Target, dtype: int64
```

In [ ]:
```
sns.countplot(x='Target',data=df)
```

Out[ ]:
```
<Axes: xlabel='Target', ylabel='count'>
```

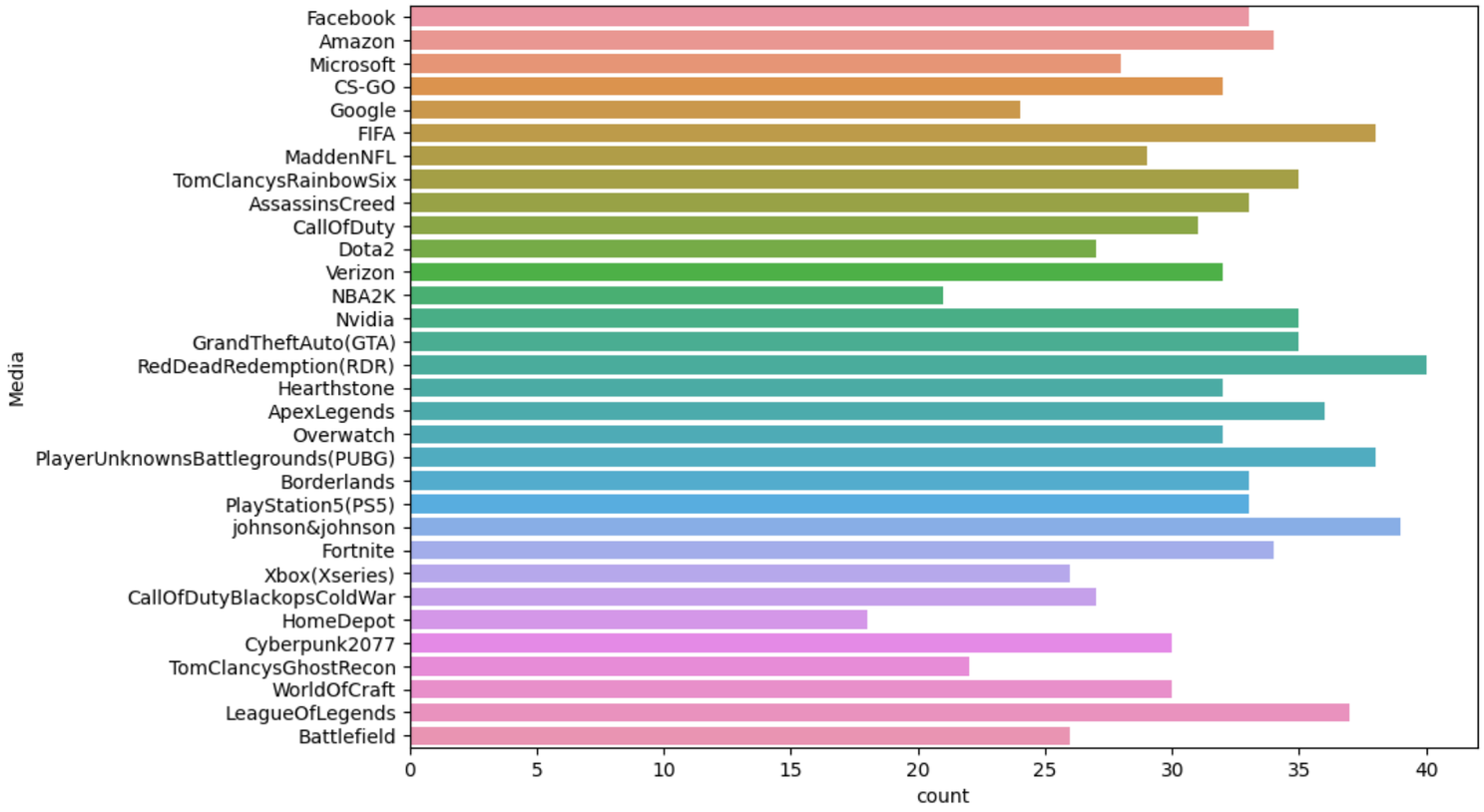


In [ ]:
```
df['Media'].value_counts()
```

Out[ ]:
```
RedDeadRedemption(RDR)              40
johnson&johnson                     39
FIFA                                38
PlayerUnknownsBattlegrounds(PUBG)   38
LeagueOfLegends                     37
ApexLegends                         36
TomClancysRainbowSix                35
Nvidia                              35
GrandTheftAuto(GTA)                 35
Amazon                              34
Fortnite                            34
Facebook                            33
PlayStation5(PS5)                   33
AssassinsCreed                      33
Borderlands                         33
Overwatch                           32
Hearthstone                         32
Verizon                             32
CS-GO                               32
CallOfDuty                          31
Cyberpunk2077                       30
WorldOfCraft                        30
MaddenNFL                           29
Microsoft                           28
Dota2                               27
CallOfDutyBlackopsColdWar           27
Xbox(Xseries)                       26
Battlefield                         26
Google                              24
TomClancysGhostRecon                22
NBA2K                               21
HomeDepot                           18
Name: Media, dtype: int64
```

In [ ]:
```
plt.figure(figsize=(10,7))
sns.countplot(y='Media',data=df)
```

Out[ ]:
```
<Axes: xlabel='count', ylabel='Media'>
```



3)Dropping irrelevent values in Rows & Reseting index

In [ ]:
```
df.drop(df.index[(df['Target']=='Irrelevant')],axis=0,inplace=True)
#or
#df.loc[df['Target']!='Irrelevant']
df
```

Out[ ]:

	Id	Media	Target	Text
1	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
2	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
3	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
4	4433	Google	Neutral	Now the President is slapping Americans in the...
5	6273	FIFA	Negative	Hi @EAHelp Iâve had Madeleine McCann in my c...
...	...	...	...	...
993	314	Amazon	Negative	Please explain how this is possible! How can t...
994	9701	PlayStation5(PS5)	Positive	Good on Sony. As much as I want to see the new...
997	2652	Borderlands	Positive	Today sucked so itâs time to drink wine n pl...
998	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
999	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 4 columns

In [ ]:
```
df['Target'].unique()
```

Out[ ]:
```
array(['Neutral', 'Negative', 'Positive'], dtype=object)
```

In [ ]:
```
#resetindex
df.reset_index(drop=True,inplace=True)
df
```

Out[ ]:

	Id	Media	Target	Text
0	352	Amazon	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
1	8312	Microsoft	Negative	@Microsoft Why do I pay for WORD when it funct...
2	4371	CS-GO	Negative	CSGO matchmaking is so full of closet hacking,...
3	4433	Google	Neutral	Now the President is slapping Americans in the...
4	6273	FIFA	Negative	Hi @EAHelp Iâve had Madeleine McCann in my c...
...	...	...	...	...
823	314	Amazon	Negative	Please explain how this is possible! How can t...
824	9701	PlayStation5(PS5)	Positive	Good on Sony. As much as I want to see the new...
825	2652	Borderlands	Positive	Today sucked so itâs time to drink wine n pl...
826	8069	Microsoft	Positive	Bought a fraction of Microsoft today. Small wins.
827	6960	johnson&johnson	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 4 columns

In [ ]:
```
df.drop(['Id','Media'],axis=1,inplace=True)
df
```

Out[ ]:

	Target	Text
0	Neutral	BBC News - Amazon boss Jeff Bezos rejects clai...
1	Negative	@Microsoft Why do I pay for WORD when it funct...
2	Negative	CSGO matchmaking is so full of closet hacking,...
3	Neutral	Now the President is slapping Americans in the...
4	Negative	Hi @EAHelp Iâve had Madeleine McCann in my c...
...	...	...
823	Negative	Please explain how this is possible! How can t...
824	Positive	Good on Sony. As much as I want to see the new...
825	Positive	Today sucked so itâs time to drink wine n pl...
826	Positive	Bought a fraction of Microsoft today. Small wins.
827	Neutral	Johnson & Johnson to stop selling talc baby po...

828 rows × 2 columns

4)Replace String to Numeric

In [ ]:
```
df['Target']=df['Target'].map({'Positive':1,'Negative':-1,'Neutral':0})
df
#df['Target']=df['Target'].str.replace('Positive','1')
#df['Target']=df['Target'].str.replace('Negative','-1')
#df['Target']=df['Target'].str.replace('Neutral','0')
```

Out[ ]:

	Target	Text
0	0	BBC News - Amazon boss Jeff Bezos rejects clai...
1	-1	@Microsoft Why do I pay for WORD when it funct...
2	-1	CSGO matchmaking is so full of closet hacking,...
3	0	Now the President is slapping Americans in the...
4	-1	Hi @EAHelp Iâve had Madeleine McCann in my c...
...	...	...
823	-1	Please explain how this is possible! How can t...
824	1	Good on Sony. As much as I want to see the new...
825	1	Today sucked so itâs time to drink wine n pl...
826	1	Bought a fraction of Microsoft today. Small wins.
827	0	Johnson & Johnson to stop selling talc baby po...

828 rows × 2 columns

5)Download for NLP

In [ ]:
```
nltk.download('stopwords')
nltk.download('punkt')
nltk.download('wordnet')
nltk.download('omw-1.4')
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data] Downloading package omw-1.4 to /root/nltk_data...
```

Out[ ]:
```
True
```

6)Assigning to a variable output column

In [ ]:
```
tweets=df.Text
tweets
```

Out[ ]:
```
0      BBC News - Amazon boss Jeff Bezos rejects clai...
1      @Microsoft Why do I pay for WORD when it funct...
2      CSGO matchmaking is so full of closet hacking,...
3      Now the President is slapping Americans in the...
4      Hi @EAHelp Iâve had Madeleine McCann in my c...
                           ...
823    Please explain how this is possible! How can t...
824    Good on Sony. As much as I want to see the new...
825    Today sucked so itâs time to drink wine n pl...
826    Bought a fraction of Microsoft today. Small wins.
827    Johnson & Johnson to stop selling talc baby po...
Name: Text, Length: 828, dtype: object
```

7)Tokenization using TweetTokenizer

In [ ]:
```
#Tokenization
#TweetTokenizer
from nltk import TweetTokenizer
tk=TweetTokenizer()
tweets=tweets.apply(lambda x:tk.tokenize(x)).apply(lambda x:" ".join(x))
tweets
```

Out[ ]:
```
0      BBC News - Amazon boss Jeff Bezos rejects clai...
1      @Microsoft Why do I pay for WORD when it funct...
2      CSGO matchmaking is so full of closet hacking ...
3      Now the President is slapping Americans in the...
4      Hi @EAHelp Iâ   ve had Madeleine McCann in m...
                            ...
823    Please explain how this is possible ! How can ...
824    Good on Sony . As much as I want to see the ne...
825    Today sucked so itâ   s time to drink wine n...
826    Bought a fraction of Microsoft today . Small w...
827    Johnson & Johnson to stop selling talc baby po...
Name: Text, Length: 828, dtype: object
```

8)Remove Special characters using re (Regular expression)

In [ ]:
```
#Remove special characters
#Regular expression
tweets=tweets.str.replace('[^a-zA-Z0-9]+',' ')
tweets
```

In [ ]:
```
from nltk.tokenize import word_tokenize
tweets=tweets.apply(lambda x:' '.join([w for w in word_tokenize(x) if len(w)>=3]))
tweets
```

Out[ ]:
```
0      BBC News Amazon boss Jeff Bezos rejects claims...
1      Microsoft Why pay for WORD when functions poor...
2      CSGO matchmaking full closet hacking truly awf...
3      Now the President slapping Americans the face ...
4      EAHelp had Madeleine McCann cellar for the pas...
                            ...
823    Please explain how this possible How can they ...
824    Good Sony much want see the new PS5 what going...
825    Today sucked time drink wine play borderlands ...
826           Bought fraction Microsoft today Small wins
827    Johnson Johnson stop selling talc baby powder ...
Name: Text, Length: 828, dtype: object
```

9)Stemming using SnowballStemmer

In [ ]:
```
#Stemming
from nltk.stem import SnowballStemmer
stemmer=SnowballStemmer('english')
tweets=tweets.apply(lambda x:[stemmer.stem(i.lower()) for i in tk.tokenize(x)]).apply(lambda x:' '.join(x))
tweets
```

Out[ ]:
```
0      bbc news amazon boss jeff bezo reject claim co...
1      microsoft whi pay for word when function poor ...
2           csgo matchmak full closet hack truli aw game
3      now the presid slap american the face that rea...
4      eahelp had madelein mccann cellar for the past...
                            ...
823    pleas explain how this possibl how can they le...
824    good soni much want see the new ps5 what go ri...
825    today suck time drink wine play borderland unt...
826            bought fraction microsoft today small win
827    johnson johnson stop sell talc babi powder and...
Name: Text, Length: 828, dtype: object
```

10)Remove Stopwords

In [ ]:
```
#Remove Stopwords
from nltk.corpus import stopwords
stop=stopwords.words('english')
tweets=tweets.apply(lambda x:[i for i in word_tokenize(x) if i not in stop]).apply(lambda x:' '.join(x))
tweets
```

Out[ ]:
```
0      bbc news amazon boss jeff bezo reject claim co...
1      microsoft whi pay word function poor samsungus...
2           csgo matchmak full closet hack truli aw game
3      presid slap american face realli commit unlaw ...
4      eahelp madelein mccann cellar past year littl ...
                             ...
823    pleas explain possibl let compani overcharg sc...
824    good soni much want see new ps5 go right much ...
825    today suck time drink wine play borderland sun...
826            bought fraction microsoft today small win
827    johnson johnson stop sell talc babi powder can...
Name: Text, Length: 828, dtype: object
```

11)Vectorization

In [ ]:
```
from sklearn.feature_extraction.text import TfidfVectorizer
vec=TfidfVectorizer()
train_data=vec.fit_transform(tweets)
```

In [ ]:
```
print(train_data)
```

```
(0, 691)      0.2608257828483461
(0, 1004)     0.2608257828483461
(0, 1130)     0.23509805002803952
(0, 1996)     0.13277165480466424
(0, 309)      0.22681557001542715
(0, 860)      0.17354914655342313
(0, 807)      0.21432663830218204
(0, 2761)     0.2608257828483461
(0, 568)      0.2608257828483461
(0, 1833)     0.24577602391989378
(0, 633)      0.22681557001542715
(0, 376)      0.1515362387424402
(0, 2287)     0.38864111655856126
(0, 538)      0.49155204783978756
(1, 797)      0.4055823664694651
(1, 2891)     0.4055823664694651
(1, 2558)     0.3821800909185634
(1, 1405)     0.4055823664694651
(1, 3679)     0.36557591217188057
(1, 2462)     0.3126902562590763
(1, 3639)     0.26216072802580975
(1, 2155)     0.24555654927912696
(2, 1427)     0.1689251539717079
(2, 486)      0.36574263611909275
(2, 3432)     0.36574263611909275
:     :
(825, 3393)   0.3395996844494919
(825, 3383)   0.2560582225152134
(825, 631)    0.22981061112100945
(825, 997)    0.2315686698425631
(825, 3373)   0.21750175079084832
(825, 3226)   0.2904718522758868
(825, 2527)   0.17148706662740873
(826, 1381)   0.5079831062080814
(826, 3070)   0.47867226429410115
(826, 636)    0.4174215841659411
(826, 3650)   0.353278941165688
(826, 3383)   0.34523850330234374
(826, 2155)   0.3075542453642147
(827, 195)    0.3283693467320579
(827, 1132)   0.3283693467320579
(827, 2808)   0.3283693467320579
(827, 143)    0.3283693467320579
(827, 712)    0.2770320970909926
(827, 2946)   0.2635889502019104
(827, 3274)   0.2635889502019104
(827, 3193)   0.2311987519368367
(827, 1686)   0.15963411936668057
(827, 2576)   0.24870786898500463
(827, 506)    0.23743856420618148
(827, 1854)   0.3947412386878786
```

In [ ]:
```
train_data.shape
```

Out[ ]:
```
(828, 3783)
```

In [ ]:
```
x=train_data
x
```

Out[ ]:
```
<828x3783 sparse matrix of type '<class 'numpy.float64'>'
        with 10505 stored elements in Compressed Sparse Row format>
```

In [ ]:
```
y=df['Target'].values
y
```

Out[ ]:
```
array([ 0, -1, -1,  0, -1,  1,  1,  1, -1,  1,  1, -1,  0, -1,  1,  1, -1,
        1, -1, -1,  0, -1,  0,  0, -1, -1,  1,  1, -1,  1, -1,  0,  0,  1,
        0,  1,  0,  0,  0,  1,  0, -1, -1, -1,  0,  1, -1, -1,  1,  1,  1,
        1,  1, -1, -1,  1,  1, -1,  0, -1,  0, -1,  1, -1, -1,  1,  1,  1,
        0,  0,  0,  1,  1,  0,  1,  0, -1, -1,  0,  0, -1,  1, -1, -1, -1,
        0,  1,  0, -1,  1,  1,  0,  1,  0,  1, -1,  0,  0,  0, -1,  0, -1,
        0,  0,  1,  1,  0, -1, -1,  1, -1,  0, -1,  1,  0, -1,  0,  1,  0,
        1,  1,  0,  0,  0,  0,  1,  0,  1,  1, -1,  0,  0,  0,  0, -1,  0,
        1, -1,  0, -1,  0, -1, -1,  1,  1,  1,  0,  0,  1,  0,  0,  0,  0,
        1,  0, -1, -1,  0,  1,  1,  0,  1,  1,  0,  0, -1, -1, -1, -1,  1,
        0,  0,  1,  1,  1,  1, -1,  1,  1,  0, -1, -1, -1,  1,  1, -1, -1,
        1,  1, -1,  1,  1, -1,  1,  0, -1,  0,  0,  1, -1,  1,  1,  0,  1,
       -1, -1,  1,  1,  1,  1,  0,  0,  1, -1,  0,  1,  0, -1,  0,  0, -1,
        1,  1, -1,  0,  1,  0, -1,  0, -1,  1,  1, -1, -1, -1,  1, -1,  0,
        1,  0,  0, -1,  1, -1,  1, -1,  0,  0,  1, -1,  0, -1,  1, -1,  1,
        1,  1,  1,  1,  1, -1, -1,  1, -1,  0,  0,  0,  1,  0,  1, -1,  0,
        0,  0,  0, -1,  1, -1, -1,  1,  1,  0,  0, -1, -1, -1,  0,  1,  0,
       -1,  1,  0, -1, -1, -1,  1,  0,  0, -1,  1,  1,  0,  1,  0,  0,  1,
        1, -1,  0,  1, -1,  0, -1, -1,  1,  1,  1,  1,  0, -1,  0,  1,  0,
        1, -1, -1, -1,  1,  0,  1, -1,  0,  1,  1,  1,  0,  0,  0,  1,  0,
       -1, -1,  0,  0,  1, -1, -1, -1,  0,  0,  0, -1, -1,  1, -1,  0, -1,
        0,  1, -1,  0,  1,  1, -1,  0,  0,  1, -1, -1, -1,  0,  0, -1,  1, -1,
        0, -1, -1, -1,  1, -1,  1, -1,  1, -1, -1,  0, -1,  0, -1,  1, -1,
        0, -1, -1,  0,  0,  1, -1,  1,  0,  0,  0,  0, -1,  0,  0,  0, -1,
       -1,  0,  1,  0,  0, -1,  0,  1,  0,  0,  0,  0,  0,  1,  0,  1,  1,
        1,  0, -1,  1,  0,  0, -1,  1,  0,  0, -1,  0, -1,  0,  1, -1,  1,
       -1, -1,  0,  0,  0,  0,  1,  1,  1, -1, -1,  0,  1,  0,  0, -1,  1,
        1,  0,  1, -1, -1,  0,  1, -1,  1, -1,  0,  1,  1,  0,  0,  0,  1,
        0, -1,  0,  0, -1,  1, -1,  0,  1,  1,  1,  1,  0, -1,  0,  1,  1,
        1,  1,  1, -1,  0,  1,  0,  0, -1, -1, -1,  0,  1,  0, -1,  1,  1,
        1,  0,  1, -1,  0, -1,  0, -1,  0,  0,  1, -1,  1,  1,  0, -1,  0,
       -1, -1, -1, -1,  1,  1,  1,  0, -1, -1,  1, -1, -1,  0,  0,  1,
        0, -1,  0,  1, -1,  0,  1, -1,  0,  0,  1, -1,  0, -1,  1,  1,  0,
        1,  0,  1, -1,  0,  0,  0,  1,  0,  0, -1,  1,  0, -1, -1,  0,  0,
        1,  0,  1,  0, -1, -1,  1,  1,  1,  1,  0, -1,  1,  1, -1, -1, -1,
        0,  1,  0,  1,  1,  0,  1, -1,  1,  1,  1,  0])
```

12)Split the data into Training & Testing data

In [ ]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.30,random_state=42)
```

13)Model Creation

- knn
- Naive_bayes
- SVM

In [ ]:
```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import BernoulliNB
from sklearn.svm import SVC
knn=KNeighborsClassifier(n_neighbors=7)
model=BernoulliNB()
model1=SVC()
lst=[knn,model,model1]
```

14)Performance Evaluation

In [ ]:
```
from sklearn.metrics import confusion_matrix,accuracy_score,classification_report
for i in lst:
   print(i)
   i.fit(x_train,y_train)
   y_pred=i.predict(x_test)
   print(accuracy_score(y_test,y_pred))
   print(confusion_matrix(y_test,y_pred))
   print(classification_report(y_test,y_pred))
```

```
KNeighborsClassifier(n_neighbors=7)
0.46987951807228917
[[57 13  9]
 [34 29 16]
 [46 14 31]]
              precision    recall  f1-score   support

          -1       0.42      0.72      0.53        79
           0       0.52      0.37      0.43        79
           1       0.55      0.34      0.42        91

    accuracy                           0.47       249
   macro avg       0.50      0.48      0.46       249
weighted avg       0.50      0.47      0.46       249

BernoulliNB()
0.5823293172690763
[[54  7 18]
 [14 29 36]
 [22  7 62]]
              precision    recall  f1-score   support

          -1       0.60      0.68      0.64        79
           0       0.67      0.37      0.48        79
           1       0.53      0.68      0.60        91

    accuracy                           0.58       249
   macro avg       0.60      0.58      0.57       249
weighted avg       0.60      0.58      0.57       249

SVC()
0.5823293172690763
[[41 34  4]
 [ 9 60 10]
 [11 36 44]]
              precision    recall  f1-score   support

          -1       0.67      0.52      0.59        79
           0       0.46      0.76      0.57        79
           1       0.76      0.48      0.59        91

    accuracy                           0.58       249
   macro avg       0.63      0.59      0.58       249
weighted avg       0.64      0.58      0.58       249
```

In [ ]: